

**Graphical Analysis Practice**

1. What is the domain of the graph?

$(-\infty, +\infty)$

2. What is the range of the graph?

$(-\infty, 4]$

3. Identify the intervals on which the graph is increasing.

$(-\infty, 1]$

$[0, 2]$

4. How do you know this graph is a function?

Vertical Line test

For each input or x-value  
there is only one  
output (y-value)

<p>5. Find the value of:</p> <p><math>f(1) = 1</math></p> <p><math>f(2) = 4</math></p> <p><math>f(5) = 3</math></p>	<p>6. Find the values for x where:</p> <p><math>f(x) = 0</math></p> <p><math>x = -2</math> <math>x = 0</math></p> <p><math>f(x) = 2</math></p> <p><math>x = 1.5</math></p>
<p>7. Identify the coordinate points of any local maximum.</p> <p><math>x = -1</math></p> <p><math>x = 2</math></p>	

### Building Functions

Find and simplify each problem, using the following functions:

$$f(x) = x^2 + 4x - 5 \quad g(x) = 7 + 3x$$

<p>8. Find <math>2f(x) - 3g(x)</math></p> <p><math>2(x^2 + 4x - 5) - 3(7 + 3x)</math></p> <p><math>2x^2 + 8x - 10 - 21 - 9x</math></p> <p><math>2x^2 - 1x - 31</math></p>	<p>9. Find <math>g(f(-2))</math> - same as <math>(f \circ g)(-2)</math></p> <p><math>g(f(-2)) = 7 + 3(x^2 + 4x - 5)</math></p> <p><math>g(f(x)) = 3x^2 + 12x - 8</math></p> <p><math>g(f(-2)) = 12 - 24 - 8</math></p> <p><math>= -20</math></p>
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## Inverse Functions

Find the inverse functions of the following problems:

10.  $f(x) = (5x+6)^2$

$$x = (5y+6)^2$$

$$\sqrt{x} = 5y+6$$

$$\frac{\sqrt{x}-6}{5} = f^{-1}(x)$$

11.  $f(x) = \frac{7x-3}{2}$

$$\frac{2x+3}{7} = f^{-1}(x)$$

**Factoring** Factor the following expressions. (4 pts each)

12.  $x^2 + 8x + 7$

$$(x+1)(x+7)$$

13.  $4x^2 + 12x - 72$

$$4(x+6)(x-3)$$

14.  $9x^2 + 6x - 8$

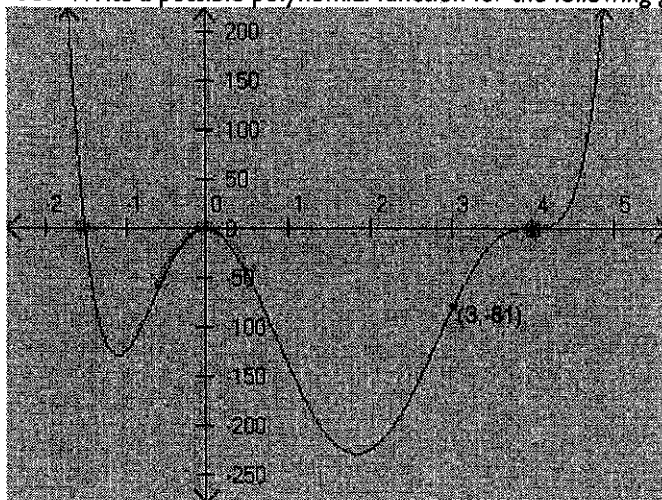
$$9x^2 + 6x - 8 \rightarrow (3x-2)(3x+4)$$

15.  $25x^2 + 15x + 2$

$$(5x+1)(5x+2)$$

## Polynomials (5 pts each)

16. Write a possible polynomial function for the following graph:



$$y = (x-4)^3(x)^2(x+1.5)$$

17. Solve for the x-intercepts of  $2x^2 - 7x + 8 = x^2 - 8x + 50$

$$-x^2 + 15x - 42 = 0$$

$$x^2 - 15x + 42 = 0$$

$$(x-7)(x-6) = 0$$

$$x = -7 \quad x = 6$$

18. Create a possible function that has an odd degree, a negative leading coefficient, x-intercepts at 5, 2, -3, and -6. Write the equation AND draw a sketch of the graph.

### Rational Expressions (5 pts each)

19. Reduce:  $\frac{4x^2 + 4x - 80}{2x^2 + 7x + 10}$

$$\frac{4(x^2 + x - 20)}{2x^2 + 7x + 10}$$

$$\frac{4(x+5)(x-4)}{(2x+5)(x+2)}$$

20. Reduce:  $\frac{x^2 + 5x + 6}{x^2 - 4} \cdot \frac{x^2 + 3x + 2}{x^2 - 2x - 3}$

$$\frac{(x+3)(x+2)}{(x-2)(x+3)} \cdot \frac{(x+2)(x+1)}{(x-3)(x+1)}$$

$$\frac{(x+2)}{(x-2)(x-3)}$$

21. Combine and reduce the rational expression:

$$\frac{3x+5}{x+2} + \frac{x+4}{x+3}$$

$$\frac{4x^2 + 20x + 23}{(x+3)(x+2)}$$

22. Combine and reduce the rational expression:

$$\frac{3}{x+2} - \frac{6}{x-4}$$

$$\frac{-3x-24}{(x+2)(x-4)}$$

Solve the following equations for x.

23.  $5^{2x+1} = 497$

$$x = 1.429$$

24.  $3(2^{x-4}) - 6 = 52$

$$x = 8.14$$

25.  $27^{-2x+6} = \left(\frac{1}{9}\right)^{5x}$

$$3(-2x+6) = -10x$$

$$\frac{6}{-4} = x$$

17.  $\log_6(-3m-1) = \log_6(-4m-6)$

$$-3m-1 = -4m-6$$

$$m = -5$$

26.  $-2 \cdot \log_8(x+1) = -8$

$$4095$$

28.  $2\ln(x) - 4 = 6$

$$e^5 = x$$

or

$$148.4 = x$$

29.  $\ln(x+1) - \ln(x-2) = \ln(2)$

$$\frac{x+1}{x-2} = 2$$

$$x+1 = 2x-4$$

$$-x = -5$$

$$x = 5$$

